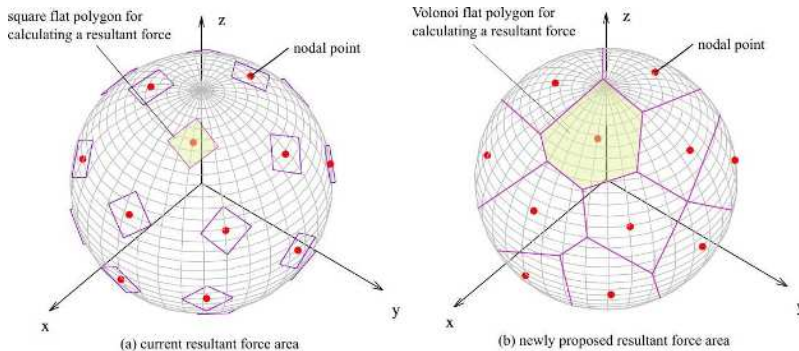


Name SAIMOTO Akihide	Job Title Professor	Area of Expertise Mechanics of Solids
1. Main Research Topics ① Development of an innovative system for numerical stress analysis A numerical calculation system that enables high-precision stress analysis of arbitrary three-dimensional elastic bodies using the body force method, which is a boundary stress analysis method is being developed. This system is particularly powerful for crack analysis. ② High-precision processing of materials for electric devices by controlling crack propagation In general, machining of hard and brittle materials often results in reduced processing accuracy due to tool wear and heat generated. Additionally, coolants used to reduce the temperature of the cutting tools can contaminate the material. Therefore, we are researching a method to cut hard and brittle materials without using tools by controlling the crack path. Specifically, we are investigating the industrial application of crack propagation control for the processing of electronic devices using SiC and GaN as substrates, which are highly anticipated as power semiconductors. ③ Numerical prediction of deformation and failure processes of solids based on numerical simulations of crack growth and coalescence As there exist a strong stress singularity at the crack tip, its numerical analysis is generally very difficult. In particular, numerical analysis of situations where multiple cracks exist and interfere with each other is almost impossible using general-purpose numerical methods such as FEM. Therefore, a powerful numerical evaluation system for predicting a behavior of crack growth and coalescence is being developed. This system has potential applications in the medical field, such as the analysis of fractures caused by excessive external forces acting on the human body.  Preliminary experiment for Wafer cleaving  (a) current resultant force area (b) newly proposed resultant force area New analysis strategy for calculating a 3D stress concentration using resultant force of surface area		
2. Keywords Stress analysis, Deformation analysis, Dynamic analysis, Electric device, Body force method		
3. Remarks and Websites We are conducting research on processing wafers made of semiconductor materials such as Si, SiC, and GaN into the desired shape without using cutting tools. These semiconductor materials share the common characteristics of being hard and brittle, making them unsuitable for mechanical processing that involves cutting or removal. On the other hand, their brittle nature means that they have low crack propagation resistance. Therefore, we are investigating methods for controlling crack propagation to perform fracture processing. Here, the key point is to establish a method for intentionally propagating cracks along a desired path, utilizing technologies such as lasers, ultrasonics, and non-contact heat sources. researchmap: https://researchmap.jp/s-aki Laboratory: http://www.mech.nagasaki-u.ac.jp/lab/solid/index.html		